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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/537,161

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Kazuhiko Fukutani

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EXAMINER

BERDICHEVSKY, MIRIAM

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/537,161	<b>Applicant(s)</b> FUKUTANI ET AL.	
	<b>Examiner</b> MIRIAM BERDICHEVSKY	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on rce 2/9/2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 14-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/9/2010</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2/9/2010 has been entered.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ying (US 6231744), Someya (20030147801) and Iwasaki (US 20020109134).

As to claim 14, Ying teaches a method of manufacturing a thermoelectric material comprising: providing a structure in which a plurality of columns of a column forming material containing a first component distributed in a matrix material containing (figure 1), removing the column forming material to form a porous body (figure 1, (col. 5, lines 14-40), introducing a semiconductor material into the porous body (col. 5, line 43 to col. 6, line 5). Ying teaches that the material used to form the columns is anodic aluminum oxide (aluminum containing) (col. 5, lines 45-55).

Ying is silent to the two components being different such that there is a eutectic between the components wherein the column forming material contains aluminum and the matrix material contains silicon, germanium or silicon germanium.

Someya teaches that anodized aluminum and silica-alumina are art recognized equivalents in the manufacture of nanostructures ([0016]). Silica contains silicon.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use silica-alumina in Ying because silica-alumina has heat, acid and alkali stability as taught by Someya ([0016]) and use of the material would have been obvious to try with reasonable predictions of success and predictable results (MPEP 2141 III). Achieving the eutectic depends on the concentration of components. Silica-alumina is a composite of two different materials; the properties of composites depend on both materials. Changing the concentration of each component effects the properties of the composite and is a result effective variable. One of ordinary skill in the art would appreciate that optimizing the composition of the silica-alumina composite to maximize

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the properties of the material is within the skill of a worker in the art (phase diagrams and MPEP 2144).

Iwasaki teaches that a film composed of aluminum as a main component used for the formation of nanostructures similar to those of Ying can be provided in various routinely practiced methods including sputtering ([0059]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to choose sputtering as the method of providing the aluminum film in modified Ying since sputtering, being a known method (Iwasaki: [0059]), would have been obvious to try because choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success is within the general skill of a worker in the art (MPEP 2141).

Regarding claims 15-16, Ying teaches oxidizing the porous body after the removal step (col. 5, lines 22-25).

Regarding claim 17, Ying teaches filling the pores using electrodeposition (col. 9, lines 45-50).

### ***Double Patenting***

5. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422

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F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claims 14-17 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-5 of copending Application No. 12555195 in view of Iwasaki. Copending application 12555195 does not claim providing the aluminum material by sputtering. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose sputtering as the method of providing the aluminum film (Iwasaki: [0059]), would have been obvious to try because choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success is within the general skill of a worker in the art (MPEP 2141).

This is a provisional obviousness-type double patenting rejection.

7. Claims 14-17 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 9 of U.S. Patent No. 7517554 in view of Ying and Iwasaki. Patent 7517554 is silent to the use of sputtering to form the aluminum based material and to filling the removed cylinder portions with semiconductor material. Ying teaches a similar porous structure wherein the pores are filled with semiconductor material (col. 5, line 43 to col. 6, line 5) allowing for nanostructures finding utility in thermoelectrics. It would have been obvious to fill the

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cylinder portions with semiconductor material as seen in Ying to create a thermoelectric or optical device, as taught by Ying (col. 4, lines 55-70). It would have been obvious to one of ordinary skill in the art at the time of the invention to choose sputtering as the method of providing the aluminum film (Iwasaki: [0059]), would have been obvious to try because choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success is within the general skill of a worker in the art (MPEP 2141).

8. Claims 14-17 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 15-22 of U.S. Patent No. 7183127 in view of Iwasaki. Patent 7183127 is silent to the use of sputtering to form the aluminum based material and to the specific materials of the structure. It would have been obvious to one of ordinary skill in the art at the time of the invention to select a known material on the basis of its suitability for an intended use as a matter of obvious design choice (MPEP 2144). It would have been obvious to fill the cylinder portions with semiconductor material as seen in Ying to create a thermoelectric or optical device, as taught by Ying (col. 4, lines 55-70). It would have been obvious to one of ordinary skill in the art at the time of the invention to choose sputtering as the method of providing the aluminum film (Iwasaki: [0059]), would have been obvious to try because choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success is within the general skill of a worker in the art (MPEP 2141).

9. Claims 14-17 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-17 of

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compending Application No. 11409021 in view of Iwasaki. Copending application 11409021 does not claim providing the aluminum material by sputtering and to filling the removed cylinder portions with semiconductor material. Ying teaches a similar porous structure wherein the pores are filled with semiconductor material (col. 5, line 43 to col. 6, line 5) allowing for nanostructures finding utility in thermoelectrics. It would have been obvious to fill the cylinder portions with semiconductor material as seen in Ying to create a thermoelectric or optical device, as taught by Ying (col. 4, lines 55-70). It would have been obvious to one of ordinary skill in the art at the time of the invention to choose sputtering as the method of providing the aluminum film (Iwasaki: [0059]), would have been obvious to try because choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success is within the general skill of a worker in the art (MPEP 2141).

This is a provisional obviousness-type double patenting rejection.

### ***Response to Arguments***

Applicant's arguments with respect to claim 14 have been considered but are moot in view of the new ground(s) of rejection as necessitated by amendment.

Applicant argues that Ying does not teach or suggest removing column forming materials y selective etching of a phase-separated structure. The Examiner agrees, however the argument is not commensurate with the scope of the claims.



***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **MIRIAM BERDICHEVSKY** whose telephone number is (571)270-5256. The examiner can normally be reached on M-Th, 10am-8pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./  
Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795